

## CLAIMS

Having described the invention, I claim:

- 1 1. Apparatus to align an input shaft of a differential gear of a rear wheel drive vehicle with an  
2 output shaft of a transmission thereof, comprising  
3 a first attachment detachably mountable to a one of the input shaft of the differential gear  
4 and the output shaft of the transmission,  
5 a second attachment detachably mountable to an other of the input shaft of the differential  
6 gear and the output shaft of the transmission,  
7 the first attachment comprising a laser selectively emitting a first light beam toward the  
8 second attachment,  
9 the first light beam coaxial with the one of the input shaft and the output shaft to which the  
10 first attachment is detachably mountable,  
11 the second attachment comprising a target element having a region thereof aligned with the  
12 axis of the other of the input shaft and the output shaft to which the second  
13 attachment is detachably mountable,  
14 the target element intersecting the first light beam when the input shaft of the differential  
15 gear is generally aligned with the output shaft of the transmission.
- 1 2. The apparatus of claim 1 wherein  
2 the target element comprises a plate,  
3 the plate disposed in axial alignment with the other of the input shaft and the output shaft to  
4 which the second attachment is detachably mountable.
- 1 3. The apparatus of claim 1 wherein  
2 the target element includes an indicator aligned with the axis of the other of the input shaft  
3 and the output shaft to which the second attachment is detachably mountable.
- 1 4. The apparatus of claim 1 wherein  
2 the first attachment comprises a first plate having a central opening therein,  
3 the laser of the first attachment removably mounted within the central opening of the first  
4 plate.
- 1 5. The apparatus of claim 1 wherein  
2 the second attachment comprises a second laser selectively emitting a second light beam  
3 toward the first attachment,  
4 the second light beam coaxial with the other of the input shaft of the differential gear and  
5 the output shaft of the transmission to which the second attachment is detachably  
6 mounted.

1 6. The apparatus of claim 5 wherein

2 the first attachment comprises a first plate disposed perpendicularly to the light beam  
3 emitted by the laser of the first attachment,

4 the target element comprising a second plate disposed perpendicularly to the second light  
5 beam,

6 whereby the first light beam strikes the second plate and the second light beam strikes the  
7 first plate when the first laser and the second laser are concurrently activated and the  
8 input shaft of the differential gear is generally aligned with the output shaft of the  
9 transmission.

1 7. The apparatus of claim 6 wherein

2 the first plate has a central opening therein,

3 the laser of the first attachment mounted within the central opening of the first plate,

4 the second plate has a central opening therein,

5 the second laser mounted within the central opening of the second plate.

1 8. The apparatus of claim 7 wherein

2 the first attachment is detachably mountable to the output shaft of the transmission,

3 the first attachment comprises a hollow shaft coaxially mounted to the first plate,

4 the hollow shaft receivable on the output shaft of the transmission,

5 the input shaft of the differential gear comprises a differential yoke,

6 the second attachment is detachably mountable to the differential yoke.

1 9. The apparatus of claim 1 wherein

2 the first attachment includes a manually operable switch to activate the laser of the first  
3 attachment,

4 the second attachment includes a manually operable switch to activate the laser of the  
5 second attachment.

1 10. The apparatus of claim 5 wherein

2 the first light beam is a first color and the second light beam is a second color.

1 11. The apparatus of claim 1 wherein

2 the first attachment is detachably mountable to the output shaft of the transmission,

3 the first attachment comprising a hollow shaft coaxially mounted to the first plate,

4 the hollow shaft receivable on the output shaft of the transmission,

5 the input shaft of the differential gear comprising a differential yoke,

6 the second attachment detachably mountable to the differential yoke,

7 the second attachment comprising a second laser selectively emitting a second light beam

8                   toward the first attachment,  
9           the second light beam coaxial with the input shaft of the differential gear,  
10          the first attachment comprising a first plate disposed perpendicularly to the light beam  
11                emitted by the laser of the first attachment,  
12          the first plate having a central opening therein,  
13          the laser of the first attachment mounted within the central opening of the first plate,  
14          the target element comprising a second plate disposed perpendicularly to the second light  
15                beam,  
16          the second plate having a central opening therein,  
17          the second laser mounted within the central opening of the second plate,  
18          the first attachment including a manually operable switch to activate the laser of the first  
19                attachment,  
20          the second attachment including a manually operable switch to activate the laser of the  
21                second attachment.

- 1   12. A method of aligning the differential gear of a race car with the transmission thereof  
2       comprising the steps of:  
3            mounting a first laser to the differential gear of the race car,  
4            causing the first laser to emit a first light beam coaxial to an input shaft of the differential  
5                gear, the first light beam emitted in a direction toward the transmission of the race  
6                car,  
7            mounting a second laser to an output shaft of the transmission of the race car,  
8            causing the second laser to emit a second light beam coaxial to the output shaft of the  
9                transmission, the second light beam emitted toward the differential gear,  
10           observing the first light beam and the second light beam in an area between the first laser  
11                and the second laser,  
12           adjusting the orientation of the transmission and of the differential gear so that the first light  
13                beam does not intersect the second light beam.
- 1   13. The method of claim 11 further comprising the step of introducing a fine powder between the  
2       first laser and the second laser.
- 1   14. Apparatus to determine the pinion angle of a gear assembly of the drive train of a race car  
2       comprising  
3            an elongate gauge detachably mounted to extend from a rotatable shaft of the gear shaft  
4                assembly of the race car,  
5            the gauge having a longitudinal axis parallel to or coaxial with the axis of the rotatable shaft,

- 6 the gauge including a pair of elongate levels generally parallel to the axis of the camber  
7 gauge,  
8 the gauge including linear markings along each elongate level to indicate degrees of incline or  
9 decline,  
10 whereby the pinion angle of the gear assembly may be observed on the gauge.
- 1 15. The apparatus of claim 14 wherein  
2 the gauge is mounted to a plate,  
3 the plate detachably mounted coaxially to the pinion shaft of the gear assembly,  
4 the gauge having a transverse bubble level.
- 1 16. The apparatus of claim 14 wherein the gauge comprises a camber gauge.
- 1 17. A method to measure the pinion angle of a gear of a race car comprising the steps of:  
2 detachably mounting an elongate camber gauge to a rotatable shaft of the gear so that the  
3 longitudinal axis of the camber gauge extends coaxially to or in parallel to the shaft,  
4 adjusting the camber gauge so that it is transversely aligned with horizontal,  
5 reading the pinion angle by observing bubble levels on the camber gauge.
- 1 18. The method of claim 18 further comprising the steps of:  
2 detachably mounting a plate having an opening therein to the rotatable shaft of the gear, the  
3 opening coaxial with the shaft,  
4 mounting the elongate camber gauge in the opening of the plate.